Having described the invention, we claim the following:

1. A method for monitoring quality of a weld being formed between first and second pieces of material, the method comprising the steps of:

obtaining a thermal image of the weld being formed by collecting infrared radiation passing through the second piece of material; and

analyzing the obtained thermal image for characteristics indicative of a properly formed weld.

2. The method of claim 1 wherein the step of obtaining a thermal image of the weld being formed further includes the step of:

obtaining a thermal image that includes, in its entirety, a weld pool that results in the weld.

3. The method of claim 2 wherein the step of obtaining a thermal image that includes the weld pool in its entirety further includes the step of:

positioning an infrared detector that is configured to detect infrared radiation having a wavelength that passes through the second piece of

material on a side of the second piece of material opposite the first piece of material and in a location in which the weld pool in its entirety is within a field of view of the infrared detector.

4. The method of claim 2 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the steps of:

determining a temperature of each portion of the weld pool; and

comparing the determined temperature of each portion of the weld pool with a threshold temperature range.

5. The method of claim 4 wherein the step of comparing the determined temperature of each portion of the weld pool with a threshold temperature range further includes the steps of:

determining a time at which the thermal image was obtained; and

comparing the determined temperature of each portion of the weld pool with a threshold temperature range that is associated with the determined time to

determine whether the determined temperatures are within the associated threshold temperature range.

6. The method of claim 5 further including the step of:

providing a feedback signal to a weld controller in response to determining that a determined temperature is outside of the associated threshold temperature range.

7. The method of claim 2 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the steps of:

determining a width of the weld pool at all locations along a path of the weld pool; and

comparing the determined widths to a threshold width range to determine whether the determined widths are within the threshold width range.

8. The method of claim 7 further including the step of:

providing a feedback signal to a weld controller in response to determining that a determined width is outside of the threshold width range.

9. The method of claim 2 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the step of:

analyzing the weld pool in its entirety for indications of a void in the weld pool.

10. The method of claim 9 further including the step of:

providing a feedback signal to a weld controller in response to determining that a void exists in the weld pool.

11. The method of claim 1 further including the step of:

providing a feedback signal to a weld controller in response to determining that a characteristic fails to meet an associated criterion.

12. The method of claim 1 further including the step of:

providing an alarm signal to an alarm device in response to determining that a characteristic fails to meet an associated criterion.

13. A method for monitoring quality of a weld being formed between first and second pieces of material, the method comprising the steps of:

determining a range of wavelengths of infrared radiation that will pass through the second piece of material;

positioning an infrared detector that is configured to detect infrared radiation within the determined range of wavelengths on a side of the second piece of material opposite the first piece of material;

obtaining a thermal image of the weld being formed between the first and second pieces of material by collecting infrared radiation within the determined range of wavelengths; and

analyzing the obtained thermal image for characteristics indicative of a properly formed weld.

14. The method of claim 13 wherein the step of obtaining a thermal image of the weld being formed further includes the step of:

obtaining a thermal image that includes, in its entirety, a weld pool that results in the weld.

15. The method of claim 14 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the steps of:

determining a temperature of each portion of the weld pool; and

comparing the determined temperature of each portion of the weld pool with a threshold temperature range.

16. The method of claim 15 wherein the step of comparing the determined temperature of each portion of the weld pool with a threshold temperature range further includes the steps of:

determining a time at which the thermal image was obtained; and

comparing the determined temperature of each portion of the weld pool with a threshold temperature

range that is associated with the determined time to determine whether the determined temperatures are within the associated threshold temperature range.

17. The method of claim 16 further including the step of:

providing a feedback signal to a weld controller in response to determining that a determined temperature is outside of the associated threshold temperature range.

18. The method of claim 14 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the steps of:

determining a width of the weld pool at all locations along a path of the weld pool; and

comparing the determined widths to a threshold width range to determine whether the determined widths are within the threshold width range.

19. The method of claim 18 further including the step of:

providing a feedback signal to a weld controller in response to determining that a determined width is outside of the threshold width range.

20. The method of claim 14 wherein the step of analyzing the obtained thermal image for characteristics indicative of a properly formed weld includes the step of:

analyzing the weld pool in its entirety for indications of a void in the weld pool.

21. The method of claim 20 further including the step of:

providing a feedback signal to a weld controller in response to determining that a void exists in the weld pool.

22. The method of claim 13 further including the step of:

providing a feedback signal to a weld controller in response to determining that a characteristic fails to meet an associated criterion.

23. The method of claim 13 further including the step of:

providing an alarm signal to an alarm device in response to determining that a characteristic fails to meet an associated criterion.